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THE TEREBRIDAE (GASTROPODA) OF CLARION,
SOCORRO, COCOS, AND GALÁPAGOS ISLANDS

By

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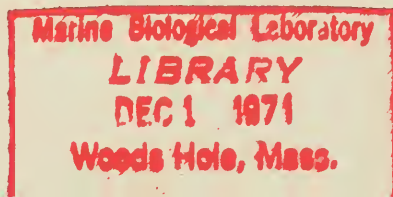
The Ecuador-owned Galápagos archipelago touches the equator 600 miles west of Ecuador. In spite of lying in the equatorial zone, the Humboldt Current from the Antarctic, flowing north along South America's coast and swinging west through the Galápagos, brings water cold enough to support penguins and seals. The Islands, which are scattered over an area of 3,000 square miles, now have Spanish names. In this study the Spanish names will be used with their English or secondary names in parentheses.

Since Charles Darwin's day, the Galápagos Islands have fascinated naturalists as being the "cradle of new species" for both vertebrate and invertebrate fauna, so it is not surprising that some of the *Terebra* species should prove to be new. Some of the species from this area are so variable that it would be difficult to assign specimens at the ends of the variability range to the same species if there were not intergrades between the two extremes available for study.

This study originally was intended to include only the Galápagos Islands, but when additional material was made available, we included Cocos Island, Costa Rica, and Socorro and Clarion islands, Mexico.

It is almost to our embarrassment that we discovered four new species among the 16 species we examined from the off-shore islands (Bratcher and Burch, 1970, pp. 1-6, figs. 1-9). Each of these new species was checked against the original description, original figure (if any), and wherever possible, the holotype or photograph of the holotype of each of the more than 180 Recent and fossil species of *Terebra* described from the eastern Pacific area and related species from the

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Indo-Pacific and western Atlantic areas. Many of the names proposed for the eastern Pacific Recent and fossil species of *Terebra* are synonyms, but only those concerned with the areas included in this paper will be assessed as to validity here. This list is not expected to be all-inclusive, but it contains each of the species we have encountered in the above-mentioned material.

ACKNOWLEDGMENTS

We wish to express our thanks to Dr. Leo G. Hertlein for his encouragement, for the loan of material from the California Academy of Sciences, for making literature available, and for making holotypes accessible for study and photography. In the same institution, Maurice Giles prepared the photographs (with the exception of figure 20) used as text figures; Mrs. Margaret Hanna kindly retouched the original photographs shown in figures 2, 4, 7, 9, and 29; and Barry Roth aided in the arrangement of the illustrations. Acknowledgments also are due to Dr. James McLean for the loan of Hancock Expedition material from the Los Angeles County Museum of Natural History; Drs. Harald Rehder and J. Rosewater of the National Museum for the loan of types and material; Dr. George Radwin of the San Diego Museum of Natural History for loan of material; and William Old, Jr. and Dr. William K. Emerson of the American Museum of Natural History for the loan of material. We also appreciate the loan of specimens for this study by the Ben Purdys of San Diego, California, the Carl Shys of Westminster, California, and Jacqueline DeRoy of Academy Bay, Santa Cruz (Indefatigable) Island, Galápagos Islands. We wish to thank Dr. Norman Tebble for making available holotypes in the British Museum (Natural History) for study and photography; Dr. Stillman Berry, the John Q. Burches, and Dr. R. W. Barker for the use of their fine libraries; the Hancock Library and the California Academy of Sciences library personnel for their help and cooperation; Allyn Smith for his encouragement; and Ford Bratcher for understanding the time needed for research in this study.

SYSTEMATICS

TOXOGLOSSA Troschel, 1848

Family TEREBRIDAE H. and A. Adams, 1853

Genus *Terebra* Bruguière, 1789

Terebra stohleri Bratcher and Burch.

(Figures 1, 2.)

Terebra stohleri BRATCHER and BURCH, Los Angeles County Mus. Nat. Hist., Contrib. in Sci., no. 188, p. 5, figs. 7, 8, May 4, 1970.

TYPE. Holotype, Los Angeles County Museum of Natural History—Allan Hancock Foundation no. 1180.

TYPE LOCALITY. "Braithwaite Bay, Socorro Island, Mexico, $18^{\circ} 42' 20''$ N., $110^{\circ} 56' 15''$ W., sand and red mud bottom." 18 to 37 meters (10 to 20 fathoms).

DISTRIBUTION. Cabo Pulmo, Baja California, Mexico, to Socorro Island, Mexico, 2 to 23 fathoms.

DESCRIPTION. Shell medium-small, sturdy; color and appearance of ivory with faintly darker blotches; color of nucleus slightly darker than the following whorls; whorls convex; sutures deeply channeled, constricted; subsutural band inconspicuous; whorls slightly shouldered anterior to suture; sculpture of sharp, slightly curved axial ribs about equal to the interspaces crossed by evenly spaced spiral grooves; body whorl of medium length; posterior to the periphery sculpture remains the same; anterior to periphery axial ribs continue, and spiral grooves become more numerous and close set; aperture elongate; outer lip thin with sculpture pattern showing through; columella straight and simple; siphonal fasciole striate; anterior canal short, recurved.

DISCUSSION. No species known to us can easily be confused with this beautifully sculptured shiny terebra.

Terebra purdyae Bratcher and Burch.

(Figures 3, 4.)

Terebra purdyae BRATCHER and BURCH, Los Angeles County Mus. Nat. Hist., Contrib. in Sci., no. 188, p. 5, figs. 5, 6, May 4, 1970.

TYPE. Holotype, Los Angeles County Museum of Natural History—Allan Hancock Foundation no. 1182.

TYPE LOCALITY. "North of Santa Maria (Charles) Island, Galápagos Islands, Ecuador, $0^{\circ} 59' S.$, $90^{\circ} 25' W.$, 70–80 fms., sand and rock bottom."

DISTRIBUTION. Panama to Peru, 16 to 146 meters (8 to 80 fathoms).

DESCRIPTION. Shell small and slender; shiny pale cream color with inconspicuous fulvous blotches; nucleus of four purple-beige convex whorls; remainder of whorls almost flat; suture fairly well marked; barely evident subsutural band of beading slightly more prominent than the bands of beading on remainder of whorl; sculpture finely cancellate (remarkably consistent from second post-nuclear whorl) crossed by cords giving a beaded effect; axial ribs about equal to interspaces; body whorl of medium length; sculpture continuing anterior to periphery but less well defined; aperture elongate and slender, interior being the same color as exterior; columella straight with one microscopic plication; faint siphonal fasciole with posterior keel; anterior canal short, recurved.

DISCUSSION. Although the sculpture of *Terebra purdyae* is one of the most finely cancellate known to us, it does have some general resemblance to several other species. *Terebra panamensis* Dall (1908) is larger, with a coarser cancellate sculpture, fewer ribs, and with interspaces wider than the almost equal interspaces of *T. purdyae*. The fossil species *T. gatunensis* Toulou (1908) and the

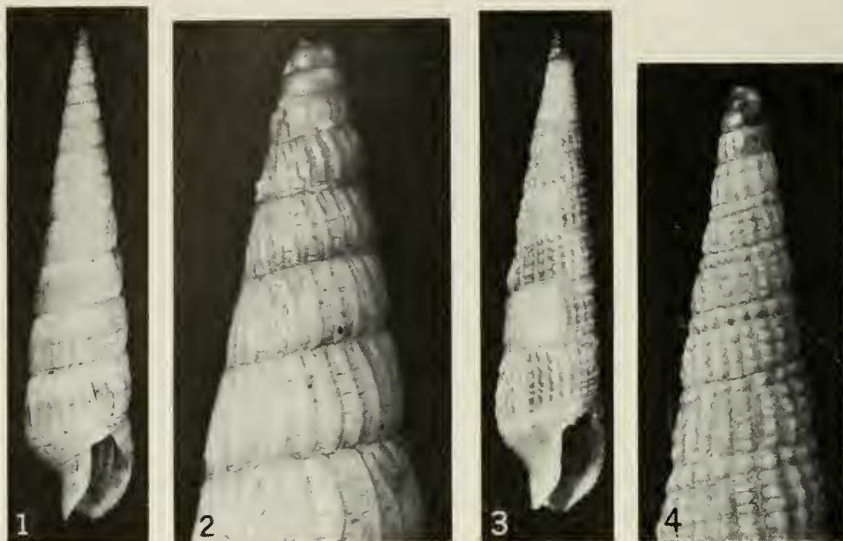


FIGURE 1. *Terebra stohleri* Bratcher and Burch. Holotype no. 1180, Los Angeles County Museum of Natural History, Type Collection. Braithwaite Bay, Socorro Island, Mexico. Length 21.4 mm., width 5.1 mm.

FIGURE 2. Nucleus, same shell as figure 1.

FIGURE 3. *Terebra purdyae* Bratcher and Burch. Holotype no. 1182, Los Angeles County Museum of Natural History, Type Collection. Santa Maria (Charles) Island, Galápagos Islands. Length 13.9 mm., width 3.3 mm.

FIGURE 4. Nucleus, same shell as figure 3.

subspecies *T. g. kugleri* Rutsch (1934) from the Neogene of Panama and Venezuela, are much larger species with less cancellate sculpture and wider subsutural bands. *Terebra stohleri* Bratcher and Burch (1970) has more convex whorls and spiral grooves rather than spiral cords. The sculpture of *T. purdyae* most closely resembles that of *T. shyana* Bratcher and Burch (1970) but *T. purdyae* is a smaller, more slender species.

Average size about 13 mm.

Terebra jacquelineae Bratcher and Burch.

(Figures 5, 6, 7.)

Terebra jacquelineae BRATCHER and BURCH, Los Angeles County Museum, Contrib. in Sci., no. 188, p. 2, figs. 3, 4, May 4, 1970.

TYPE. Holotype, California Academy of Sciences, Department of Geology, Type Collection no. 13215.

TYPE LOCALITY. "Academy Bay, Santa Cruz (Indefatigable) Island, Galá-

pagos Islands, Ecuador, $0^{\circ} 46' 16''$ S., $90^{\circ} 19' 38''$ W., CAS loc. 39585, about 10 fathoms, on hard packed coralline sand bottom."

DISTRIBUTION. This species seems to be confined to the Galápagos Islands. Specimens have been taken from the vicinity of Santa Cruz (Indefatigable), San Salvador (James), and Baltra (South Seymour) islands in water from 4 to 37 meters (2 to 20 fathoms).

DESCRIPTION. Shell of medium size; usually shiny cream color throughout; one and one-half shiny opaque nuclear whorls, the first somewhat bulbous; the early postnuclear whorls flat, the remaining whorls being very concave: sculpture on first postnuclear whorls consists of weak axial ribs ending in small nodes at suture with obsolete spiral grooves which cross the ribs; apical angle increases after about the sixth postnuclear whorl and ribs begin fading at center of whorl while nodes at rib endings become more prominent, those anterior to suture being slightly more prominent than the posterior ones; interspaces on later whorls contain minute microscopic growth striae, body whorl of medium length with obsolete axial ribs ending in nodes at periphery; anterior to row of nodes, weakly incised spiral grooves cross equally weak axial ones; aperture elongate, white within; columella white, straight with rounded plication which continues as keel setting off well developed siphonal fasciole; anterior canal short, recurved.

DISCUSSION. Although most specimens we have examined are of a light cream color, we have seen a number of individuals, most of which were collected at San Salvador (James) Island, which range in color from beige to light brown with cream colored nodes. While there is little variation among individuals of this species except that some are more slender than others, some small or immature specimens have the peripheral nodes forming a sharp keel differing in appearance from adults.

There are several species, concave in profile, which somewhat resemble *Terebra jacquelineae* in general appearance. *Terebra frigata* Hinds differs from *T. jacquelineae* in that the former is smaller, less concave, and has continuous ribs from suture to suture. The ribs are less bulbous at their anterior endings, and there is more pronounced spiral sculpture and a more slender profile. In the latter the ribs fade out at the middle of the whorl; the spiral sculpture is weak or barely evident; and the nodes at the suture are more inflated. The Gulf of Mexico species *T. concava* Say (1827) is a much more slender form with small sharp nodes at the subsutural band and periphery and more numerous spiral grooves than *T. jacquelineae*. The East Indian species *T. constricta* Thiele (1925) is considerably smaller than *T. jacquelineae* and has fine spiral striae, and the Persian Gulf species *T. contracta* E. A. Smith (1873) is also a smaller species with more numerous spiral striae and a laminated columella not evident in *T. jacquelineae*.

The average size of this species is about 30 mm. The largest specimen

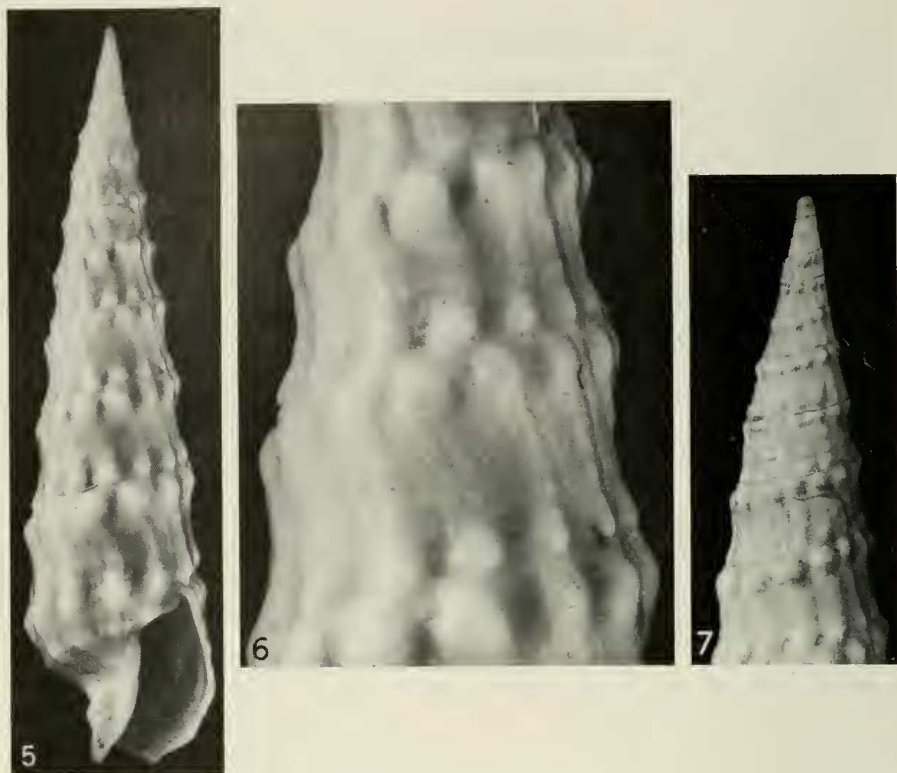


FIGURE 5. *Terebra jacquelinae* Bratcher and Burch. Holotype no. 13215, California Academy of Sciences, Department of Geology, Type Collection. Academy Bay, Santa Cruz (Indefatigable) Island, Galápagos Islands. Length 33.2 mm., width 8.4 mm.

FIGURE 6. Middle whorls, same shell as figure 5.

FIGURE 7. Nucleus, same shell as figure 5.

examined by us is 36.9 mm. in length, 10.8 mm. in diameter. It is in the collection of Mrs. Jacqueline DeRoy.

***Terebra hertleini* Bratcher and Burch.**

(Figures 8, 9.)

Terebra hertleini BRATCHER and BURCH, Los Angeles County Museum, Contrib. in Sci., no. 188, p. 1, figs. 1, 2, May 4, 1970.

TYPE. Holotype, California Academy of Sciences, Department of Geology, Type Collection no. 13222.

TYPE LOCALITY. "Academy Bay, Santa Cruz (Indefatigable) Island, Galápagos Islands, Ecuador, 08° 46' 16" S., 90° 19' 38" W., CAS loc. 27536, 3.5 to 5.5 fms, dredged."

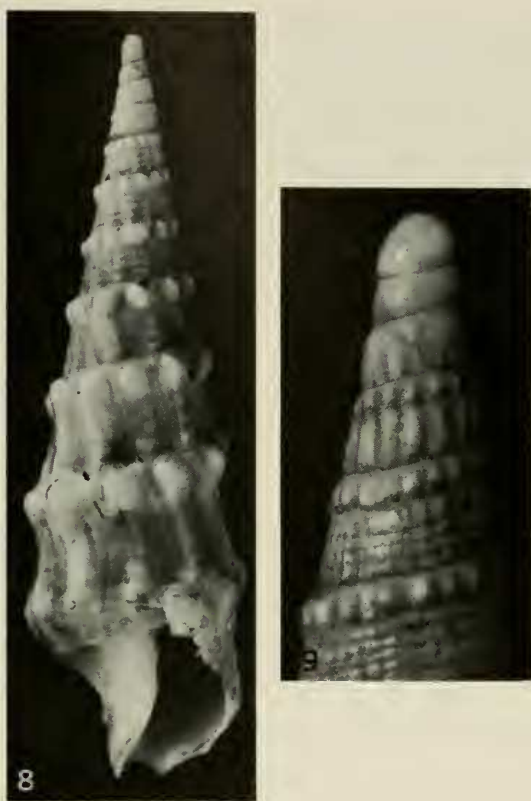


FIGURE 8. *Terebra hertleini* Bratcher and Burch. Holotype no. 13222, California Academy of Sciences, Department of Geology, Type Collection. Santa Cruz (Indefatigable) Island, Galápagos Islands. Length 11.8 mm., width 5 mm.

FIGURE 9. Nucleus, same shell as figure 8.

DISTRIBUTION. All the specimens of this species examined by us came from the Galápagos Islands in depths from 6 to 46 meters (3.5 to 25 fathoms).

DESCRIPTION. Shell small, white, turreted; two glassy, convex, nuclear whorls, the first one constricted; postnuclear whorls flat; sculpture consists of spiral cords, about three per whorl, and obsolete axial ribs ending in large nodes anterior to suture; sculpture on body whorl of three spiral cords crossing obsolete ribs that end in faint nodes at periphery, these nodes being less prominent than those at the suture; anterior to periphery spiral cords cross minute axial striations; aperture somewhat quadrate; outer lip thin, white within; columella straight with one weak plication; well developed siphonal fasciole with sharp keel; anterior canal of medium length, recurved.

DISCUSSION. The spiral cords on shells of this species are variable, being well

defined on some individuals and almost obsolete on others. The nodes at the periphery of the body whorl are inconspicuous in some specimens and more prominent in others. The apertures of all specimens examined exhibit a rather quadrate look, and some have a definite flair at the periphery.

Although *Terebra hertleini* is one of the smaller species of terebrids, it presents some general superficial resemblance to larger species which also are profoundly turreted. *Terebra tiarella* Deshayes (1857) is a larger species, with more numerous and finer spiral striae and an elongate aperture that does not exhibit the peripheral swelling of *T. hertleini*. The distinct axial ribs of *T. frigata* Hinds (1844) along with its more slender and longer nucleus and spiral grooves distinguish that species from *T. hertleini*, which has indistinct, fading axial ribs, a broad dome-like nucleus, and spiral cords. Juvenile and subadult specimens of *T. hertleini* begin to show a crenulated, turreted, subsutural band about the fourth postnuclear whorl. *Terebra armillata* Hinds (1844) and the fossil subspecies, *T. armillata sheppardi* Pilsbry and Olsson (1941) along with *T. nelsoni* Hanna and Israelsky (1925) are all much larger in size than *T. hertleini*. The last two species are fossil in the Neogene of Peru and Ecuador. *Terebra jacquelinae* Bratcher and Burch (1970) is much larger. The holotype of *T. hertleini* with ten whorls measures 11.8 mm. in length while the holotype of *T. jacquelinae* with 13 whorls measures 33.2 mm. *Terebra jacquelinae* has a row of large nodes posterior to the suture which *T. hertleini* does not have.

***Terebra maculata maculata* (Linnaeus).**

(Figures 12, 13.)

Buccinum maculatum LINNAEUS, Syst. Nat., ed. 10, p. 741, 1758. Ref. to Buonanni, Recr. and Mus. Kircher, 3, fig. 317, 1684; Rumphius, Amboin. Rariteit., pl. 30 (in part), fig. A. (only; not figs. B, D), 1705; Gualtieri, Index. Test., pl. 56, fig. I (all; not fig. B), 1742; Argenville, Conchyl., pl. 14, fig. A, 1742. DODGE, Bull. Amer. Mus. Nat. Hist., vol. 111, Art. 3, pt. 4, p. 218, 1956.

Not *Buccinum maculatum* Linnaeus var. KAEMMERER, Cab. Rudolstadt, p. 152, no. 11a, 1786. (Referable to *Terebra*.)

Not *Buccinum maculatum* Linnaeus vars. *B* and *C*, GMELIN, Syst. Nat., ed. 13, p. 3499, 1791. (Referable to *Terebra*.)

Acus columna trajana HUMPHREY, Mus. Calonnianum, p. 31, 1797. (Invalid for Nomenclature, International Commission of Zoological Nomenclature: Opinion 51).

Not *Terebra maculata* PERRY, Conch., pl. 16, fig. 2, 1811.

Terebra maculosa Lamarck, KIENER, Icon. Coq. Viv., vol. 8, pt. 5, Index to species of *Terebra*, 1839.

Terebra maculata var. *confluens* DAUTZENBERG, Mem. Mus. Nat. Hist. Belg., Ser. 2, vol. 17, p. 31, 1935.

Terebra maculosa (Linnaeus) HANNA and HERTLEIN, Proc. Calif. Acad. Sci., Fourth series, vol. 30, no. 3, p. 67, 1961.

Terebra cf. *T. maculata* (Linnaeus), EMERSON and OLD, Nautilus, vol. 77, no. 3, p. 91, 1964.

TYPE. Holotype, probably in Linnaean Society collection in London (Dodge).

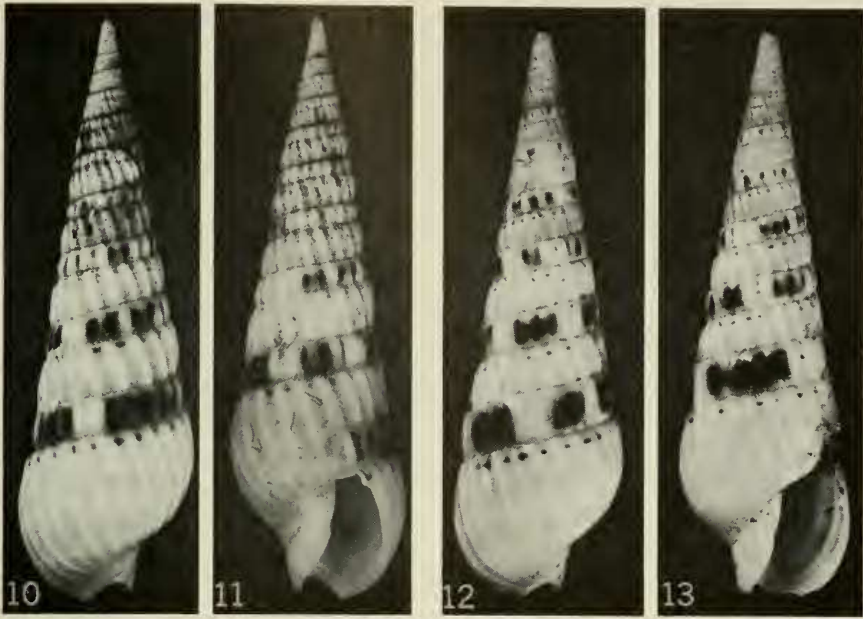


FIGURE 10. *Terebra maculata roosevelti* Bartsch and Rehder. Hypotype no. 13228, California Academy of Sciences, Department of Geology, Type Collection. Binner's Cove, Socorro Island, Revillagigedo Islands, Mexico. Dorsal view. Length 23 mm., width 7 mm.

FIGURE 11. *Terebra maculata roosevelti* Bartsch and Rehder. Same specimen as figure 10. Apertural view.

FIGURE 12. *Terebra maculata maculata* (Linnaeus). Oahu, Hawaii. Collected by C. S. Weaver. Bratcher and Burch Collection no. 522. Dorsal view. Length 19 mm., width 5.7 mm.

FIGURE 13. *Terebra maculata maculata* (Linnaeus). Same specimen as figure 12. Apertural view.

TYPE LOCALITY. "In O. Africae, Asiae."

DISTRIBUTION. Cocos Island, Costa Rica, and Indo-Pacific.

DESCRIPTION. Shell large, sturdy; color varies from shiny dark cream through orange buff to almost melanistic coloration, all ornamented with irregular, squarish, brown markings on subsutural band and brown dots, also irregular, on whorls anterior to subsutural band; nucleus of three inflated, shining opaque whorls; whorls flat to slightly convex, shouldered anterior to subsutural band which is set off by deeply channeled suture and clearly defined spiral groove; early sculpture of regular, straight, slightly oblique axial ribs on whorl and subsutural band; interspaces appear smooth; axial ribs fade out on later whorls until only axial growth striae are evident; spiral groove marking subsutural band also disappears though color pattern of band continues through body whorl; body whorl of medium length with rounded periphery; color of body whorl bro-

ken by light spiral bands which are crossed by light axial bands, giving body whorl a tessellated appearance in most specimens; aperture elongate, sturdy; columella short with one oblique fold, cream in color; anterior canal slightly recurved.

DISCUSSION. This is the largest species of *Terebra* with specimens measuring over 300 mm. in length. Melanistic coloration mentioned above is rare with most specimens being a dark cream color. We have examined seven specimens of *T. maculata maculata* in this study. American Museum of Natural History no. 14613, three specimens, were collected dead and had suffered natural damage as by wave action or predator and showed subsequent unusual distortion with elongation of body whorl. One specimen showed damage on three occasions. We have not encountered this damage to specimens in other areas, but this may be because of collectors selecting only better specimens. Four specimens in the collection of the U. S. National Museum, no. 568100, did not show the above-mentioned damage. All specimens were collected at Cocos Island, Costa Rica.

The difference between this species and the subspecies *Terebra maculata roosevelti* Bartsch and Rehder (1939) is that the subspecies retains definite axial ribs in adult specimens, while *T. m. maculata* loses the ribs on later whorls. *Terebra m. maculata* also reaches a much greater size.

***Terebra maculata roosevelti* Bartsch and Rehder.**

(Figures 10, 11.)

Terebra (Subula) roosevelti BARTSCH and REHDER, Smithsonian Miscell. Coll., vol. 98, no. 10 (Publ. 3535), p. 1, pl. 1, fig. 6, June 13, 1939.

TYPE. Holotype no. 472534, United States National Museum.

TYPE LOCALITY. "It was dredged on Socorro Island, Mexico, in 7-8 fathoms on sandy bottom, off the landing beach toward the rocky point forming the east side of the cove."

DISTRIBUTION. We have examined specimens of this species from the following collection stations in addition to the type lot: California Academy of Sciences, locality 34112, Binner's Cove, Socorro Island, Revillagigedo Islands, Mexico, in 20 meters (11 fathoms). Allan Hancock Pacific Expedition collection station, 922-39, Braithwaite Bay, Socorro Island, Revillagigedo Islands, Mexico, in 18 to 37 meters (10 to 20 fathoms). This is currently considered to be a rare shell, and we have encountered no specimens except from Socorro Island, Mexico, the type locality of this species.

DESCRIPTION. Shell medium large, sturdy; color shiny dark cream to orange-buff, ornamented with irregular squarish brown markings on subsutural band and small brown dots, also irregular, on whorls anterior to subsutural band; nucleus three inflated, shining opaque whorls; whorls flat to slightly convex, shouldered anterior to subsutural band which is set off by deeply channeled suture and

clearly defined spiral groove; early sculpture of regular, straight, slightly oblique axial ribs on whorl and subsutural band, ribs becoming less close-set and regular on later whorls, fading out more on subsutural band than on remainder of whorl; interspaces appear smooth; body with rounded periphery and axial ribs continuing to sharp keel which sets off siphonal fasciole; aperture elongate, same color as body whorl with brown markings showing through; columella short with one oblique fold, yellowish cream in color; anterior canal slightly recurved.

DISCUSSION. *Terebra maculata roosevelti* is indistinguishable from specimens of *T. m. maculata* (Linnaeus, 1758) of the same size, including the nucleus under magnification. The difference between the species and the subspecies is that the former grows to a much greater size and loses the axial ribs in the later whorls while the subspecies retains the ribs as do some specimens of *T. strigata* Sowerby (1825). We believe this to be a subspecies which has developed during geographic isolation. In even the largest specimens of *T. m. maculata*, the shape of the aperture, the columella, and the very sharp keel setting off the siphonal fasciole remain the same as in *T. m. roosevelti*.

Average size about 50 mm.

Terebra frigata Hinds.

(Figures 16, 17.)

Terebra frigata HINDS, Prov. Zool. Soc. London for 1843, p. 162, issued June, 1844. A new name for *Terebra gracilis* Gray [in part, Galápagos Islands record only]. [Not *T. gracilis* Gray, Proc. Zool. Soc. London for 1834, p. 61, November 25. "Hab. ad Africae oras." (= *T. grayi* E. A. Smith, 1877)] [Not *T. gracilis* Lea, 1833.] HINDS, Thes. Conch., vol. 1, p. 163, pl. 44, fig. 71, January 15, 1845. Locality same as original. REEVE, Conch. Icon., vol. 12, *Terebra*. pl. 24, fig. 132, 1860. "Hab. Galápagos Islands (in coral sand); Cuming." [Not a good figure of this species.] TRYON, Man. Conch., fol. 7, p. 26, pl. 7, fig. 26, 1885. [A copy of Reeve's illustration.]

Terebra galapagina DALL and OCHSNER, Proc. Calif. Acad. Sci., ser. 4, vol. 17, no. 4, p. 100, pl. 2, fig. 2, June 22, 1928. [Fossil.] Holotype no. 2897, California Academy of Sciences, Department of Geology Type Collection. "1¼ miles northeast of Vilamil, Albemarle Island, Galapagos Group. Probably Pleistocene."

TYPE. Holotype British Museum (Natural History).

TYPE LOCALITY. "Galápagos Islands; in six fathoms, coral sand."

DISTRIBUTION. Galápagos Islands, Ecuador.

DESCRIPTION. Shell small, slender; color shiny white; nucleus of three inflated, shining, opaque whorls with a constriction between nucleus and first post-nuclear whorl; whorls slightly concave; sculpture of strong, straight, axial ribs extending over entire whorl swelling into elongate nodes anterior to suture which in some specimens gives the appearance of a convex subsutural band set off on the anterior by punctations between the nodes; interspaces slightly narrower than the axial ribs with about five rows of well defined spiral striae which faintly cross ribs. This is a variable species. In some specimens the sculpture is con-

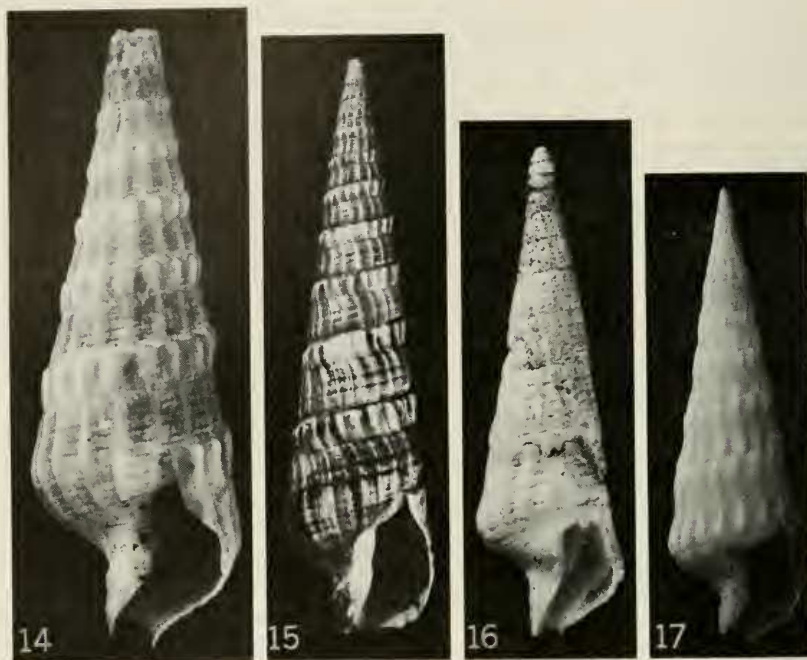


FIGURE 14. *Terebra plicata* Gray. Hypotype no. 13230, California Academy of Sciences, Department of Geology, Type Collection. Locality 23154 (CAS), Española (Hood) Island, Galápagos Islands. One end of variability range. Apex lacking. Length 15.6 mm., width 5.1 mm.

FIGURE 15. *Terebra plicata* Gray. Tagus Cove, Isabela (Albemarle) Islands, Galápagos Islands. Bratcher and Burch Collection no. 728. Collected by Jacqueline DeRoy. Other end of variability range. Length 48 mm., width 12.3 mm.

FIGURE 16. *Terebra frigata* Hinds. Tagus Cove, Isabela (Albermarle) Island, Galápagos Islands. Los Angeles County Museum of Natural History, Hancock Collection no. 1181 (324-35). Juvenile specimen, end of variability range. Length 8.6 mm., width 2.8 mm.

FIGURE 17. *Terebra frigata* Hinds. Hypotype no. 13229, California Academy of Sciences, Department of Geology, Type Collection. Post Office Bay, Santa Maria (Charles; Floreana) Island, Galápagos Islands. Typical form for adult of this species. Length 18.3 mm., width 4.4 mm.

sistent throughout. In others, the early sculpture consists of more numerous small axial ribs crossed by spiral lines, which break into tiny nodes. Specimens with this sculpture, mostly immature, look like a different species of *Terebra*. Medium length body whorl; anterior to periphery of body whorl, the axial ribs are broken into small nodes by spiral grooves, usually three to five. Body whorl is rather squared off at base; aperture is elongate; outer lip thin with shadow of ribs showing through; columella white and shiny, straight with one plication; parietal wall with very thin callus; inconspicuous siphonal fasciole.

DISCUSSION. This is the second-most-abundant species of *Terebra* in the Galápagos collections we have examined, having been taken at 19 collecting stations of the Allan Hancock Pacific expeditions and 10 collecting stations of the California Academy of Sciences at depths from 4 to 82 meters (2 to 45 fathoms). Though it was collected at many stations, the lots contained fewer individuals than some of the large lots of *Terebra plicata* Gray (1834). Most of the specimens were live taken, and the most abundant form of this variable species matches well with the holotype of *T. galapagina* Dall and Ochsner, described from beds of Pleistocene age in the Galápagos Islands. In addition to the above mentioned collections, we have examined specimens of *T. frigate* in the DeRoy collection and the Bratcher and Burch collection.

Average size about 20 mm. Largest specimen examined is 29.9 mm. in length and 6.9 mm. in diameter.

***Terebra plicata* Gray.**

(Figures 14, 15, 18, 19, 20.)

Terebra plicata GRAY, Proc. Zool. Soc. London for 1834, p. 61, issued November 25, 1834.

[No illustration, no locality.] HINDS. Thes. Conch., vol. 1, *Terebra*, p. 165, pl. 43, fig. 61, January 15, 1845. "Guayaquil; in seven fathoms, sandy mud: Cuming." REEVE, Conch. Icon., vol. 12, *Terebra*, pl. 17, fig. 76, 1860. Same locality as preceding reference. TRYON, man. Conch., vol. 7, p. 24, pl. 7, fig. 20, 1885. Same locality as given by Hinds.

TYPE. Holotype in British Museum (Natural History).

TYPE LOCALITY. No locality originally cited. "Guayaquil, in seven fathoms, sandy mud: Cuming." (Hinds, 1845).

DISTRIBUTION. This is the most abundant species in the Galápagos material examined by us. It has been taken, sometimes in large lots, at 31 collecting stations of the Allan Hancock Pacific Expeditions and numerous California Academy of Sciences locations in depths from intertidally to 110 meters (60 fathoms). The type locality is Guayaquil, Ecuador, but at this writing we have examined no specimens of this species except those from the Galápagos Islands. It has been conspicuously absent from material we have examined from other offshore islands included in this study.

DESCRIPTION. Shell medium sized, color from flesh to dark brick red, the red, like periostracum or a wash of varnish, is not removable with lye or purex; nucleus of three glassy, lavender, rather flat whorls. In most specimens examined the first four postnuclear whorls also are lavender. Whorls flat with prominent subsutural band set apart by well defined suture and subsutural groove; sculpture variable and consisting of axial ribs, straight on the early whorls, flexuous on the later ones, with interspaces being wide in some specimens and narrow in others; interspaces crossed by spiral grooves, usually three in number, but occasionally only one, which sometimes cross ribs strongly, giving them a beaded appearance. In the majority of individuals examined, the spiral

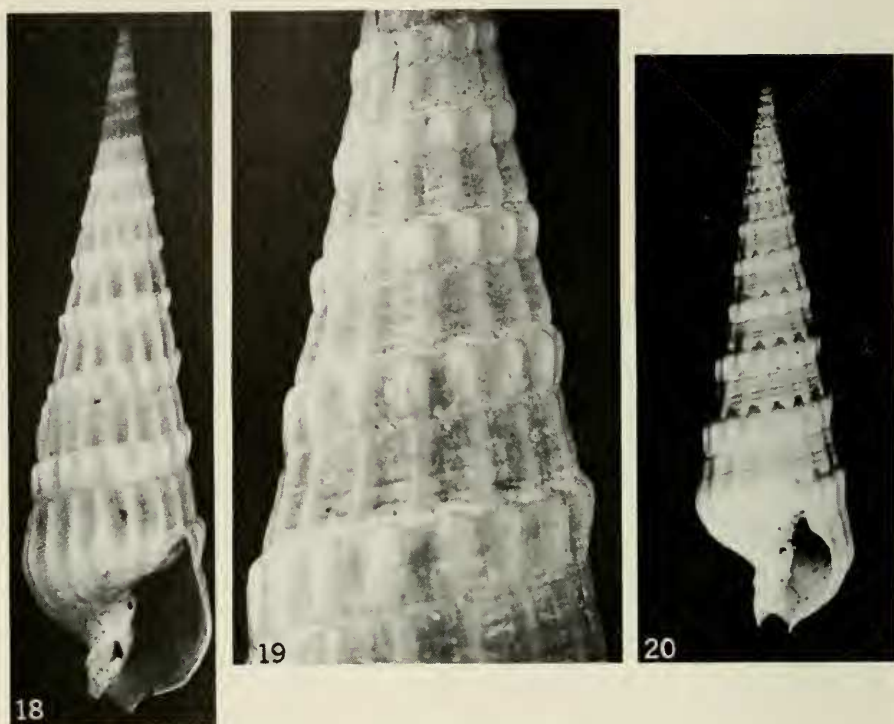


FIGURE 18. *Terebra plicata* Gray. Hypotype no. 13231, California Academy of Sciences, Department of Geology, Type Collection. From Locality 27232 (CAS), Conway Bay, Santa Cruz (Indefatigable) Island, Galápagos Islands. Length 25.6 mm., width 7 mm. Typical form.

FIGURE 19. *Terebra plicata* Gray. View of middle whorls.

FIGURE 20. *Terebra plicata* Gray. Specimen showing variation in sculpture in comparison with specimens illustrated in figures 14 and 18.

grooves cross the ribs weakly, if at all. Spiral grooves are clearly punctate in some specimens, microscopically in others. In the early whorls the subsutural band is nodulous at rib endings. On later whorls the nodes become elongate or become mere flexuous plications. In the latter case the band becomes flat and less prominent. Body whorl is of medium length with axial ribs fading somewhat at periphery. Spiral lines become more numerous at periphery and continue to the sharp keel posterior to the siphonal fasciole. Aperture elongate; outer lip thin with rib pattern showing through; columella ivory colored, straight with two plications; siphonal fasciole well developed; anterior canal broad, recurved.

DISCUSSION. Specimens with a dark beige to brick red varnish-like coating have been taken in quantities at various collecting stations from intertidal to deep water and on many types of bottom. Some of these lots have a few normal flesh-colored specimens among them.

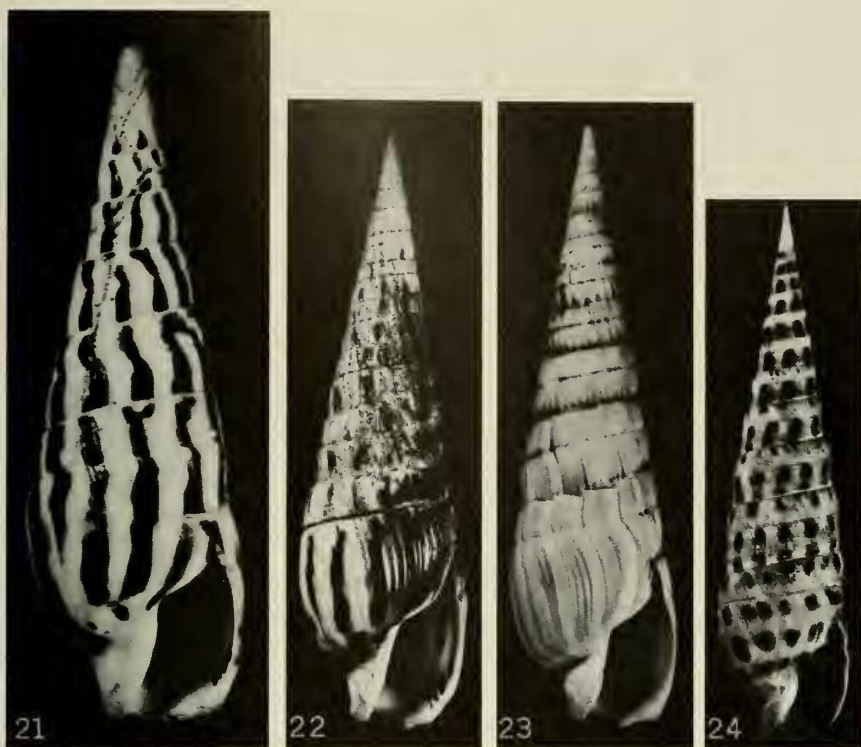


FIGURE 21. *Terebra strigata* Sowerby. Smooth form. Isabela (Albemarle) Island, Galápagos Islands. Los Angeles County Museum of Natural History, Hancock Collection no. 1185 (146-34). Length 87.3 mm., width 27.6 mm.

FIGURE 22. *Terebra strigata* Sowerby. Ribbed form. Baltra (South Seymour) Island, Galápagos Islands. Los Angeles County Museum of Natural History, Hancock Collection no. 1186 (790-38). Length 80.8 mm., width 23 mm.

FIGURE 23. *Terebra strigata* Sowerby. Without brown axial stripes. Dredged by shrimp fishermen of Guaymas, Mexico. No. 92105, Purdy Collection, San Diego, California. Length 79.2 mm., width 21.6 mm.

FIGURE 24. *Terebra ornata* Gray. Hypotype no. 13232, California Academy of Sciences, Department of Geology, Type Collection. Venedig, northern Santa Cruz (Indefatigable) Island, Galápagos Islands. Collected by Carmen Angermeyer. Length 67 mm., width 16.6 mm.

Average size about 35 mm. Largest specimen examined 70.7 mm. in length, San Diego Museum of Natural History.

***Terebra strigata* Sowerby.**

(Figures 21, 22, 23.)

Acus zebra HUMPHREY, Mus. Colonianum, p. 31, 1797. "India." [Invalid for Nomenclature, International Commission on Zoological Nomenclature: Opinion 51.]

Terebra strigata SOWERBY, Catalogue of Shells in Collection of Earl of Tankerville, Ap., p. XXIII, no. 1984, 1825. [No fig.] HINDS, Thes. Conch., vol. 1, pt. 5. *Terebra*, p. 151 (bis), pl. 41, fig. 10, 1845. "West coast of America between Panama and Realejo."

Buccinum elongatum WOOD, Index Test., Suppl., p. 13, pl. 4, fig. 25, 1828. "India." [Locality erroneus according to Hinds, 1845.]

Terebra flammea Lamarck, LESSON, Illustr. Zool., pl. 48, 1832. "vit sur les cotes de l'isthme de Panama." [Not "Hab in mare Antillarum? . . . habite le golfe des Antilles."]

Not *Terebra flammea* LAMARCK, Hist. Nat. Anim. s. Vert., vol. 7, p. 284, 1822.

Terebra zebra KIENER, Spéc. Gén. et Icon. Coq. Viv., vol. 8, *Terebra*, p. 5, no. 2, pl. 3, fig. 5, 1839. "Les cotes de l'isthme de Panama." [Not "habite le golfe des Antilles."]

TYPE. Location unknown to present authors.

TYPE LOCALITY. "Panama."

DISTRIBUTION. In addition to the locality records cited above, Reeve (1860) gives as locality, "Panama, Galápagos, and Philippine Islands; Cuming, "Moluccas etc."; and Hidalgo (1904, p. 348) repeated the Philippine citation with doubt as to its correctness. Burch (1964) states, "We have not seen *Terebra strigata* from any area other than the western Americas, where it ranges from Mexico to Peru." Grant and Gale (1931) record this species as a fossil in the Pleistocene of Ecuador and Mexico.

DESCRIPTION. Shell large and heavy; color dull cream ornamented, after about the seventh postnuclear whorl, with axial stripes of brown or black (rarely with stripes of paler cream); nucleus of two and a half beige, translucent, slightly convex whorls; whorls flat with flat subsutural band clearly defined by a spiral groove; early sculpture of very slightly curved, close-set axial ribs on both whorl and subsutural band which sometimes fade so that later whorls are smooth. Where sculpture continues through body whorl of mature specimens, ribs become small, low, and close-set, flexuous and less regular than in the early whorls; aperture elongate, cream colored with stripes of body whorl usually showing through; columella straight, simple, pale cream color: anterior canal straight, parietal wall with very thin callus in fully adult specimens.

DISCUSSION. Though most specimens have brown axial markings, we have examined four specimens which at first glance appeared to have no stripes at all, but on closer examination revealed a very faint axial stripe of slightly lighter color. One of these specimens, trawled by shrimp fishermen of Guaymas, Mexico, is in the Purdy collection, San Diego, California. Another was found tracking in sand at 6.5 to 8 meters (20 to 25 feet) at Venado Island near Guaymas, Sonora, Mexico, by Laura Shy and is in the Shy collection at Westminster, California. The others were collected at Manzanillo, Mexico, 8 to 24 meters (4.5 to 13 fathoms), by Lawrence Thomas of Morro Bay, California.

This species has been placed by Grant and Gale (1931) and Keen (1958) in *Terebra*, s.s., a subgenus characterized by the last whorls being smooth except

for the subsutural band. While many specimens have smooth last whorls, the majority of specimens examined by us have axial sculpture which continues through the body whorl. Both smooth and ribbed forms have been collected from Guaymas, Sonora, Mexico, to the Galápagos Islands.

Average size about 90 mm. Largest specimen examined by us 143.8 mm., Lawrence Thomas collection, Morro Bay, California.

***Terebra ornata* Gray.**

(Figure 24.)

Terebra ornata GRAY, Proc. Zool. Soc. London for 1834, p. 62, November 25, 1834. HINDS, Proc. Zool. Soc. London for 1843, p. 160, issued June, 1844. HINDS, Thes. Conch., vol. 1, pt. 5, *Terebra*, p. 152 (bis), no. 6, pl. 42, fig. 34, 1844. "Galapagos Islands; in five to seven fathoms, coral sand: Cuming. Panama in seven fathoms, mud." HANNA and HERTLEIN, Proc. Calif. Acad. Sci., Ser. 4, vol. 30, no. 3, p. 71, pl. 6, fig. 1961. Earlier records cited.

Not *Buccinum ornatum* MARTYN, Universal Conch., vol. 3, pl. 92, fig., 1786. [Referable to the genus *Terebra*.] [Invalid for nomenclature. International Commission on Zoological Nomenclature, Opinion 456.]

TYPE. Holotype, in British Museum (Natural History).

TYPE LOCALITY. No locality originally cited. "Galápagos Islands; five to seven fathoms, coral sand; Cuming. Panama; seven fathoms, mud; H.," cited by Hinds (1844).

DISTRIBUTION. Baja California, Mexico to the Galápagos Islands, intertidal to 96 meters (45 fathoms).

DESCRIPTION. Shell large, moderately heavy, broad apical angle; color dull white to pale cream ornamented with spiral rows of rather square dark brown spots, three rows on body whorl plus one row on subsutural band; whorls shouldered anterior to deeply constricted groove which defines the subsutural band; subsutural band nodulated on early whorls, the nodes fading completely or to slight swellings on later whorls; early whorls with very faint axial ribs sometimes swelling into nodes at the posterior end; short body whorl; aperture elongate and the same color as body whorl with the brown spots showing through; columella short, often more orange in color, with two plications, the posterior one faint and the anterior one very sharp and placed at the extreme anterior end; siphonal fasciole elongate; anterior canal recurved.

DISCUSSION. We have examined specimens of *Terebra ornata* from Santa Cruz (Indefatigable) Island, California Academy of Sciences locality no. 38898 and from South Baltra (South Seymour) Island, Galápagos, 9 meters (5 fathoms), Allan Hancock Pacific Expeditions collecting station no. 173-34.

Average size about 60 mm. Largest specimen examined 93 mm., Purdy collection, San Diego, California.

***Terebra robusta* Hinds.**

(Figure 25.)

- Terebra robusta* HINDS, Proc. Zool. Soc. London for 1843, p. 149, issued June, 1844. "Hab. West coast of America, between 8° 57' and 21° 32' north latitude; namely Panama, Gulf of Nicoya, Gulf of Papagayo, and San Blas; in from four to eighteen fathoms, sandy mud." HINDS, Zool. Voy. Sulphur, Moll., pl. 2, p. 32, October, 1844. [Same localities cited in previous reference.] HINDS, Thes. Conch., vol. 1, *Terebra*, p. 153 (bis), pl. 42, fig. 35, 1845. [Same localities cited in previous reference.] DESHAYES, Proc. Zool. Soc. London for 1859, p. 307, 1859. "Panama; Golfe de Nicoya, Golfe de Papayo; San Blas." REEVE, Conch. Icon., vol. 12, *Terebra*, sp. 10, pl. 3, fig. 10, 1860. [Same localities originally cited.] MÖRCH, Malakozool. Blätter, Bd. 7, p. 105, 1860. "Realejo." [Nicaragua.] TRYON, Man. Conch., vol. 7, p. 11, pl. 2, fig. 16 (Hinds figure), 1885. "W. Coast of Central America." GRANT and GALE, Mem. San Diego Soc. Nat. Hist., vol. 1, p. 465, 1931. "Pleistocene: Lower Quaternary at Magdalena Bay, Lower California, Mexico (Jordan). Recent: Gulf of California, Mexico, to Panama." HERTLEIN and STRONG, Bull. Amer. Mus. Nat. Hist., vol. 107, art. 2, p. 214, 1955. "Off Cape Pasado, Ecuador," also localities in that area. "Range: Guaymas, in the Gulf of California to the Rio Esmeraldas, Ecuador. Galápagos Islands." KEEN, Seashells of Tropical West America, 1958, p. 489, no. 948. "Guaymas, Gulf of California to Ecuador and the Galápagos Islands." HANNA and HERTLEIN, Proc. Calif. Acad. Sci., ser. 4, vol. 30, no. 3, p. 72, pl. 6, figs. 3, 7, 8 and pl. 7, fig. 1, Aug. 1961. "Guaymas, Sonora, Mexico, in the Gulf of California, to the Rio Esmeraldas, Ecuador, and the Galapagos Islands, in 7 to 33 meters, (4 to 18 fathoms). Also Pliocene to Recent." OLSSON, Paleont. Research Inst., Ecuadorian Neogene Mollusks, 1964, p. 76, pl. 10, fig. 9. "Angostura formation; Telemi Cayapas." Not *Terebra robusta* Hinds, GABB, Trans. Amer. Philos. Soc., vol. 15, p. 224, 1873, renamed *Terebra gabbii* Dall, 1895. Caribbean, Miocene. MAURY, Bull. Amer. Paleol., vol. 5, no. 29, sec. 1, p. 22 (186), 1917.
- Terebra lingualis* HINDS, Proc. Zool. Soc. London for 1843, p. 153, issued June, 1844.
- Terebra lotoisii* GUÉRIN-MÉNEVILLE, Mag. de Zool., 1854, p. 218, pl. 4, fig. 5, 1854.
- Not *Terebra lotoisii* DESHAYES, Proc. Zool. Soc. London for 1859. "Hab. . . ?" 1859.
- Terebra insignis* DESHAYES, Journ. Conchyl., vol. 6, p. 70, pl. 3, fig. 2. 1857.
- Terebra macrospira* LI, Bull. Geol. Soc. China, vol. 9, no. 3, p. 273, pl. 8, fig. 66, 1930. "Brought up by marine dredge from depths varying from 10 ft. to 40 ft. in the mud at the mouth of the Rio Grande near La Boca about one mile from the mainland in Panama Bay."

TYPE. Holotype, in British Museum (Natural History).

TYPE LOCALITY. "Hab. West coast of America, between 8° 57' and 21° 32' north latitude; namely at Panama, Gulf of Nicoya, Gulf of Papagayo, and San Blas; in from four to eighteen fathoms, sandy mud." "Panama" selected as type locality by Hertlein and Strong (1955).

DISTRIBUTION. Outer coast of Baja California, Mexico to Ecuador and the Galápagos Islands, intertidal to 90 meters (50 fathoms). Recorded as a fossil in Neogene formations of Panama by Li (1930), from the Quaternary at Magdalena Bay, Baja California, Mexico by Jordan and from the Neogene of Ecuador by Olsson (1964).

DESCRIPTION. Shell large; color whitish to beige decorated with brown spots

which coalesce to form axial lines; whorls rather flat, subsutural band convex on early whorls, more flattened on later ones, set off by well marked suture and constricted subsutural groove; heavy early sculpture of many tiny axial riblets ending in small nodes anterior to subsutural band and larger ones on the band itself; later sculpture in mature specimens smooth except for subsutural band; body whorl with same coalesced brown spots posterior to periphery and one row of squarish spots anterior to periphery; aperture elongate; outer lip with color pattern showing through faintly; columella slightly curved, with one plication; thin callus on parietal wall; anterior canal very short; shiny siphonal fasciole.

DISCUSSION. This species varies greatly in apical angle, often within a single population, by some individuals being slender while others are obese. In some specimens the brown spots coalesce into stripes, while in others they do not. We have examined specimens of *Terebra robusta* taken in the Galápagos Islands by the California Academy of Sciences, the Allan Hancock Pacific Expeditions, and by the DeRoys who live in the Galápagos Islands.

Average size about 60 mm. Largest specimen examined 140 mm.

***Terebra crenulata* (Linnaeus).**

(Figure 26.)

Buccinum crenulatum LINNAEUS, Syst. Nat., ed. 10, p. 741, 1758. Ref. to Gualtieri, Index Test., pl. 57, fig. L, 1742; Argenville, Conchyl., pl. 14, fig. Y, 1742. Dodge, Bull. Amer. Mus. Nat. Hist., vol. 111, Art. 3, p. 221, 1956.

Buccinum luteola MARTYN, Universal Conchologist, vol. 3, pl. 92, figure at bottom. [Invalid for Nomenclature, International Commission on Zoological Nomenclature, Opinion 456.] CHENU, Universal Conchologist, in Bibl. Conchyl., première ser., tome 2, p. 25, pl. 33, fig. 1, 1845. "Chine."

Buccinum varicosum GMELIN, Linn. Syst. Nat., ed. 13, pars. VI, p. 3505, 1791. "Habitat . . ." Ref. to Seba, Mus., 3.t.56.f.17.

Acus coronata HUMPHREY, Mus. Calonniatum, p. 31, 1797. [Invalid for Nomenclature, International Commission on Zoological Nomenclature, Opinion 51.]

Terebra maculata PERRY, Conchology, pl. 16, fig. 2, 1811. [Not the locality "The Brazils and the West Indies."]

Not *Buccinum maculatum* Linnaeus, 1758, p. 741. [A *Terebra*.]

Terebra fimbriata DESHAYES, Journ. de Conchyl., vol. 6, p. 71, pl. 5, fig. 1, 1857. [Cotypes (2) in British Mus. (Nat. Hist.) "Patria inconnue." Not found in Deshayes' collection at the École des Mines, Paris.]

Terebra interlineata DESHAYES, Proc. Zool. Soc. London for 1859, p. 277, issued between July and October, 1859. "Hab. Les Iles Sandwich." Not figured. Holotype in British Museum (Natural History).

Terebra crenulata Linnaeus var. *booleyi* MELVILL and SYKES, Proc. Malacol. Soc. London, vol. 3, p. 42, pl. 3, fig. 5, April, 1898. Andaman Islands.

TYPE. Holotype probably in Linnaean Society collection in London (Dodge).

TYPE LOCALITY. "Habitat in O. Africano."

DISTRIBUTION. Clarion and Socorro islands, Revillagigedo Islands, Mexico; Red Sea, and Indo-Pacific.

DESCRIPTION. Shell large, shining; flesh colored or light grey, often with darker blotches. After about the 12th postnuclear whorl two rows of orange-brown dots decorate each whorl and orange-brown axial lines ornament the interspaces between the nodes on the subsutural band; body whorl with a third row of dots anterior to the rounded periphery continuing into the aperture; whorls flat, with convex subsutural band; nucleus of two convex, shining whorls; early whorls white with sculpture of sharp axial ribs (narrower than interspaces) and nodose subsutural band set apart from remainder of whorl by suture and microscopically punctate subsutural groove; later sculpture with axial ribs continuing to periphery of body whorl in some individuals, fading out in others; body whorl smooth anterior to periphery except for axial growth striae; aperture quadrate; outer lip thin with orange-brown dots showing through; columella straight with one weak plication; parietal wall with thin wash of callus; well developed, striate siphonal fasciole with sharp keel; anterior canal short, broad recurved.

DISCUSSION. This species exhibits extreme variations in form and sculpture. The form described by Deshayes (1857) as *Terebra jimbrata* does not have the large and prominent nodes on the subsutural band and is generally more slender than the more common form with which it usually can be found in all areas where the species occurs. The form described as *T. interlineata* by Deshayes (1859) continues the axial sculpture of ribs to adult size. This latter form, which the Clarion Island specimens exhibit, is not uncommon in Hawaii where it is found with the more common form. We are unable to separate the Clarion Island material from this form of *T. crenulata* collected in Hawaii. Two specimens from Clarion Island, dredged at 73 meters (40 fathoms), California Academy of Sciences locality 49692, appear identical to the holotype of the form described by Deshayes as *T. interlineata*. One dead and badly damaged specimen was dredged off Cape Rule, Socorro Island, by the Allan Hancock Pacific Expedition. These, along with another specimen in the Los Angeles County Museum of Natural History collection and one in the American Museum of Natural History collection, both from Clarion Island, are the only specimens of *T. crenulata* taken in the eastern Pacific which we have examined.

The largest eastern Pacific specimen examined is 57.1 mm., though they are much larger in the Indo-Pacific area.

***Terebra armillata* Hinds.**

(Figure 27.)

Terebra armillata HINDS, Proc. Zool. Soc. London for 1843, p. 154, issued June, 1844. [No fig.] HINDS, Thes. Conch., vol. 1, *Terebra*, p. 173, pl. 43, fig. 49, 1845. KEEN, Veliger, vol. 8, no. 4, p. 273, pl. 47, fig. 18, 1966. (Photograph of syntypes.)

Not *Terebra armillata* HINDS of Menke, Zeitschr. f. Malakozool., Jahrg. 8, no. 3, p. 34, 1851; Not of REEVE, Conch. Icon., vol. 12, *Terebra* species 72 (in part), pl. 16, fig. 72a (only), 1860.

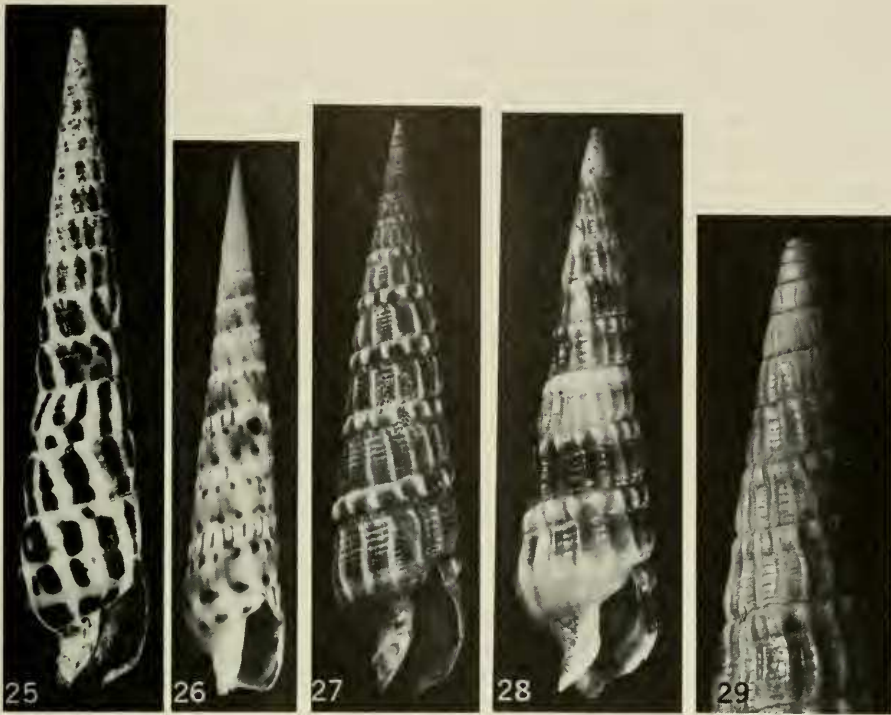


FIGURE 25. *Terebra robusta* Hinds. Punta Colorado, Guaymas, Sonora, Mexico. Bratcher and Burch Collection no. 729. Collected by Twila Bratcher. Length 90 mm., width 17.5 mm.

FIGURE 26. *Terebra crenulata* (Linnaeus). Hypotype no. 13233, California Academy of Sciences, Department of Geology, Type Collection. Clarion Island, Revillagigedo Islands, Mexico. Length 66.3 mm., width 12.5 mm.

FIGURE 27. *Terebra armillata* Hinds. Guaymas, Sonora, Mexico. Collected by G. Jacobs. Bratcher and Burch Collection no. 90. Length 40 mm., width 9.1 mm.

FIGURE 28. *Terebra berryi* Campbell. Hypotype no. 1184, Los Angeles County Museum of Natural History, Type Collection. Wafer Bay, Cocos Island, Costa Rica. Length 16.8 mm., width 4.2 mm.

FIGURE 29. Nucleus, same shell as figure 28.

Terebra albicostata ADAMS and REEVE, Zool. Voy. Samarang, Moll., pt. 2, p. 30, pl. 10, fig. 21, 1850. "Hab. China Sea." [Locality erroneous.]

Terebra marginata DESHAYES, Journ. Conchyl. vol. 6, p. 86, pl. 4, fig. 8, 1857. "Hab. L'embouchure de la Gambie." [Locality erroneous.]

TYPE. Syntypes, British Museum (Natural History).

TYPE LOCALITY. "Hab. abundant in various localities on the west coast of America between Panama and the Bay of Magdalena in Lower California, in from five to thirteen fathoms: also at the Galápagos, in ten fathoms: chiefly in sandy situations."

DISTRIBUTION. Magdalena Bay, west coast of Baja California, Mexico, to northern Peru and the Galápagos, intertidal to 73 meters (40 fathoms).

DESCRIPTION. Shell medium in size; color usually light brown with cream colored nodes on subsutural band but sometimes is light tan or yellowish; whorls slightly convex with convex subsutural band set off by well defined suture and constricted subsutural groove; sculpture quite consistent throughout of narrow, rather sharp, flexuous ribs with much wider interspaces; interspaces divided by spiral grooves (usually about five to eight) which faintly cross axial ribs; body whorl of medium length, often with a faint light stripe at periphery where axial ribs end. In most specimens, axial sculpture becomes obsolete anterior to periphery; aperture quadrate; columella curved with two plications, the posterior one continuing as a sharp keel to the well developed striate siphonal fasciole; anterior canal broad, short, curved.

DISCUSSION. In some individuals the subsutural band is decorated with large, round, pearl-like nodes; in others they are small and less conspicuous. In still others the nodes are more like elongate ribs.

Average specimen about 40 mm. Largest specimen examined 67 mm.

***Terebra berryi* Campbell.**

(Figures 28, 29.)

Terebra (Strioterebrum) berryi CAMPBELL, Veliger, vol. 4, no. 1, p. 26, figs. 5, 6, July 1, 1961.

Terebra berryi CAMPBELL, DUSHANE, and SPHON, Veliger, vol. 10, no. 3, p. 244, January 1, 1968. Puertecitos, Gulf of California.

TYPE. Holotype, no. 12352, California Academy of Sciences, Department of Geology, Type Collection.

TYPE LOCALITY. "Puertecitos, Baja California." [Mexico.]

DISTRIBUTION. East coast of Baja California, Mexico to Guatamala, intertidal to 36 meters (20 fathoms).

DESCRIPTION. Shell medium, color marbled pale lavender-gray and brownish; whorls very slightly convex; convex subsutural band set off by well defined suture and impressed groove which in some specimens becomes a sharply cut groove; sculpture of sharp flexuous axial ribs which swell into nodes on the subsutural band; ribs much narrower than interspaces on early whorls, occasionally more closely placed in later whorls, spiral grooves, about four in addition to the subsutural groove, mark the interspaces and sometimes faintly cross axial ribs; sculpture continuing on body whorl, but becoming less well defined from periphery to anterior canal which is marked with fairly deep spiral grooves; aperture elongate; outer lip thin with marbled color showing through; columella curved with one plication; well developed siphonal fasciole with sharp posterior keel; anterior canal broad, short, curved; aperture moderately laminated in adult specimens.

DISCUSSION. Color varies among the specimens examined. Some are almost entirely lavender-grey, while some are quite brownish, though all have a more or less marbled appearance. The sculpture also varies in number of ribs and width of interspaces. On one specimen taken at Cocos Island, Costa Rica, the ribs are not sharp and clearly defined, and the spiral sculpture is more noticeable than the axial sculpture.

Largest specimen examined 57.1 mm.

***Terebra litorea* Dall and Ochsner.**

(Figure 30.)

Terebra litorea DALL and OCHSNER, Proc. Calif. Acad. Sci., ser. 4, vol. 17, no. 4, p. 101, pl. 2, fig. 3, June 22, 1928.

TYPE. Holotype, California Academy of Sciences, Department of Geology, Type Collection no. 2904.

TYPE LOCALITY. "One and one-fourth miles northeast of Vilamil, Albemarle Island, Galápagos Group. Probably Pleistocene."

DISTRIBUTION. Known only from the Galápagos Islands.

DESCRIPTION. Shell large; color buff in fossil state; whorls flat, slightly constricted at weak spiral groove which sets off convex subsutural band; early sculpture weak axial ribs with nodulous subsutural band; later sculpture of flexuous axial ribs which cross subsutural band and distinct suture, ribs continuing over body whorl; aperture elongate; columella with two strong plications, the posterior of which is carried outside the aperture as a sharp keel posterior to the siphonal fasciole.

DISCUSSION. This species was described as fossil, probably of Pleistocene age, and has not been seen by us as a Recent species.

Length of the holotype is 56 mm.

***Terebra albemarlensis* Dall and Ochsner.**

(Figure 31.)

Terebra albemarlensis DALL and OCHSNER, Proc. Calif. Acad. Sci., ser. 4, vol. 17, no. 4, p. 99, pl. 2, fig. 1, June 22, 1928.

TYPE. Holotype, California Academy of Sciences, Department of Geology, Type Collection no. 2894.

TYPE LOCALITY. "One and one-fourth miles northeast of Vilamil, Albemarle Island, Galápagos Islands. Probably Pleistocene."

DISTRIBUTION. Known only from the Galápagos Islands.

DESCRIPTION. Shell large, whorls flat, slightly shouldered anterior to suture, with flat subsutural band which is nodulose in early whorls, flat in later ones; early sculpture of axial ribs, which become slightly nodulose at anterior end of



FIGURE 30. *Terebra litorea* Dall and Ochsner. Holotype no. 2904, California Academy of Sciences, Department of Geology, Type Collection. Isabela (Albemarle) Island, Galápagos Islands. Pleistocene. Length 56 mm., height of last whorl 21 mm., width 13 mm.

FIGURE 31. *Terebra albemarlensis* Dall and Ochsner. Holotype no. 2894, California Academy of Sciences, Department of Geology, Type Collection. Isabela (Albemarle) Island, Galápagos Islands. Pleistocene. Length 85 mm., height of last whorl 23 mm., maximum diameter 15 mm.

whorl, crossed by spiral grooves; later sculpture of flat ribs, on both subsutural band and remainder of whorl, crossed by weak spiral grooves; body whorl long, gently rounded at periphery; outer lip thin; aperture elongate; columella twisted, with two plications, the posterior of which forms a keel to siphonal fasciole.

DISCUSSION. This species was described as probably Pleistocene from Isabela (Albermarle) Islands, Galápagos. We have seen no specimens of this species except for the type material. Some of the larger specimens of *Terebra plicata* Gray at the end of the sculpture variability range with flatter subsutural band and more obsolete sculpture somewhat resemble this species, but we have seen none with profile and subsutural band as flat or body whorl as elongate. We

believe the fossil, *T. albemarlensis*, to be the progenitor of the Recent *T. plicata* Gray (1834).

Hastula albula (Menke).

(Figures 32, 33.)

Terebra albula MENKE, Moll. Novae Hollandiae, p. 30, 1843. [No figure.]

Terebra aciculina Lamarck, KIENER, Spéc. et Gén. Icon. Coq. Viv., Fam. Purpurifères, *Terebra*, p. 18 (in part), pl. 7, fig. 136b (only), 1838-1839. "Habite la mer des Indes." REEVE, Conch. Icon., vol. 12, *Terebra*, species 121 (in part), pl. 23, fig. 121a (only). 1860.

Not *Terebra aciculina* LAMARCK, Hist. Nat. anim. s. Vert., vol. 7, p. 290, 1822; not Tryon, Man. Conch., vol. 7, p. 32, pl. 10, fig. 81, 1885.

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Hastula gnomon KEEN, Trans. San Diego Soc. Nat. Hist., vol. 10, no. 2, p. 47, pl. 4, fig. 11, December 30, 1943. Loc. 2121 (LSJU), "California, Kern Co., Caliente Quadrangle, near center of southwest quarter of sec. 6, T. 29 S., R. 30 E., Mount Diablo B.L.M., in small gully close to terrace contact. Stratigraphic horizon: lowermost part of Round Mountain silt." Miocene. Holotype no. 7536, Stanford University Paleontology type collection.

Not *Terebra gnomon* JEFFREYS, "Paetel, Catal. Conchyl.—Sammlung. Abt. 1, p. 251, 1888." Ref. to Proc. Zool. Soc. London, 1878, p. 412. "Oc. atl." [Jeffreys' reference concerns *Aretia gnomon* Jeffreys, a brachiopod.]

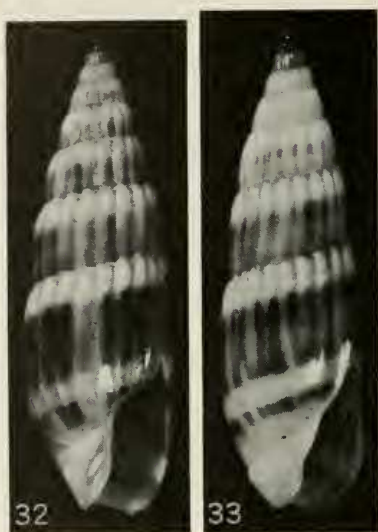


FIGURE 32. *Hastula albula* (Menke). Hypotype no. 1183, Los Angeles County Museum of Natural History. Socorro Island, Mexico. Hancock Collection no. 291.34. Length 12.3 mm., width 3.6 mm.

FIGURE 33. *Hastula albula* (Menke). Kailua Bay, Oahu, Hawaii. Collected by C. S. Weaver. Bratcher and Burch Collection no. 530. Length 12.5 mm., width 3.9 mm.

TYPE LOCALITY. "Hab. in litore occidentali."

DISTRIBUTION. East coast of Africa through the Indian and Pacific oceans to Clarion and Socorro islands, Mexico. Of the 15 lots of Recent shells we examined, all were in the vicinity of Clarion and Socorro islands taken at depths ranging from 7 to 110 meters (4 to 60 fathoms). Recorded as fossil in Neogene formations of California (Keen, 1943).

DESCRIPTION. Shell small to medium, sturdy; shining, with color ranging from very pale beige with a hint of darker stripe to dark chestnut brown with white stripe anterior to suture and at periphery; nucleus conical with four rather flat dark purple whorls with wide apical angle. Nucleus has the appearance of being set into postnuclear whorls at slight angle; first postnuclear whorl of all specimens examined are white; whorls flat; sculpture varies from specimens with straight narrow well defined axial ribs (averaging about 20 per whorl) which cover entire shell from postnuclear whorls through body whorl to specimens with axial ribs showing only as deep plications at suture and fading out on remainder of whorl; body whorl elongate with (in most specimens examined) a light stripe at periphery; aperture elongate; outer lip of medium thickness; columella straight with one microscopic fold; parietal wall with thin callus; anterior canal very short; shiny siphonal fasciole.

DISCUSSION. Of all species of *Hastula*, *H. albula* is the most variable in color, sculpture, and size. This variability may show up in a single dredged lot. Thus it has been possible for authors to describe as many as three "new species" in a single paper (Deshayes, 1859) when all are forms of *H. albula*. Specimens of *H. albula* collected in west America are indistinguishable from specimens collected in Hawaii except that the colorless or albino form is not present in west American material examined.

Average size about 18 mm. Largest west American specimen examined 27.9 mm.

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